IN THE CLAIMS:

Please cancel Claims 1-49, without prejudice to or disclaimer of the subject matter recited therein. Please add new Claims 50-89, as follows.

50. (New) A beam rotation angle detecting apparatus comprising:

a light receiving portion having a ring-shaped portion, for detecting the incidence positions of at least two beams moving on concentric circles, forming a track as a circle or an arc, and for executing the detection independently in each of a plurality of angle areas and having the function of selecting the angle areas on which the beams are to be incident in conformity with the rotation thereof; and

an arithmetic system,

wherein said arithmetic system executes correction of a rotation angle detection position for the beam on the basis of an eccentricity between rotation centers of the two beams and a center of said ring-shaped portion of said light receiving portion.

51. (New) A beam rotation angle detecting apparatus comprising:

a light receiving portion having a ring-shaped portion, for detecting a difference between characteristics of at least two incident beams moving on concentric circles, forming a track as a circle or an arc, and for independently detecting incidence position with respect to each beam having a predetermined characteristic; and

an arithmetic system,

wherein said arithmetic system executes correction of a rotation angle detection position for the beam on the basis of an eccentricity between rotation centers of the two beams and a center of said ring-shaped portion of said light receiving portion.

52. (New) A rotation detecting apparatus comprising:

two members rotatable relative to each other, at least one of said two members having the function of forming on the other member at least two beams moving on concentric circles while forming a track as a circle or an arc in conformity with the relative rotation;

a light receiving portion provided on said other member, said light receiving portion having a ring-shaped portion, detecting a difference between characteristics of at least two incident beams moving on concentric circles, forming a track as a circle or an arc, and for executing the detection; and

an arithmetic system,

wherein said arithmetic system executes correction of a rotation angle detection position for the beam on the basis of an eccentricity between rotation centers of the two beams and a center of said ring-shaped portion of said light receiving portion.

53. (New) The apparatus of Claim 52, wherein said one member has at least two light emitting portions for producing the beams moving along the circle or arc.

54. (New) The apparatus of Claim 53, wherein said at least two light emitting portions are disposed so that the centers of rotation of the beams moving along the circle or arc may coincide with the center of said light receiving portion.

55. (New) The apparatus of Claim 52, wherein said one member has at least two light transmitting windows for the incident light from the back side of said member to form the beams moving along the circle or arc.

56. (New) The apparatus of Claim 52, further comprising a condensing optical system or an orifice for making the at least two beams into light spots on said light receiving portion.

57. (New) The apparatus of Claim 52, wherein said one member has light deflecting means for changing the direction of incidence of the beams incident on said light receiving portion with the rotation of said member.

58. (New) The apparatus of Claim 57, wherein said light deflecting means has at least two reflecting members.

59. (New) The apparatus of Claim 57, wherein said light deflecting means has at least two refracting members.

60. (New) The apparatus of Claim 57, wherein said light deflecting means has a diffraction grating.

61. (New) The apparatus of Claim 57, wherein said light deflecting means is formed with a plurality of patterns of a predetermined cross-sectional shape forming a reflecting surface forming a predetermined angle with respect to the relative rotation plane of said one member, said patterns being continuously formed in parallel with the rotation plane.

62. (New) The apparatus of Claim 61, wherein said patterns of a predetermined cross-sectional shape are linear grooves or projections, or recesses of at least triangular polygonal pyramidal shape.

63. (New) The apparatus of Claim 57, wherein said light deflecting means is formed with a plurality of patterns of a predetermined cross-sectional shape forming a refracting surface forming a predetermined angle with respect to the relative rotation plane of said one member, said patterns being continuously formed in parallel with said rotation plane.

64. (New) The apparatus of Claim 63, wherein said patterns of a predetermined cross-sectional shape are linear grooves or projections, or recesses of at least triangular polygonal pyramidal shape.

65. (New) The apparatus of Claim 51, wherein said arithmetic system adds angle information corresponding to two or more incidence positions selected from among a plurality of beam incidence positions detected by said light receiving portions.

66. (New) A beam rotation angle detecting apparatus comprising:

a light receiving portion for detecting the incidence positions of at least two beams moving on concentric circles while forming a track as a circle or an arc; and

an arithmetic system for calculating and outputting the angle between a straight line linking together at least two incidence positions detected by said light receiving portion and a predetermined reference line,

wherein said light receiving portion comprises at least two circular ring-shaped portions and said arithmetic system divides the incidence position outputted by said light receiving portion by values proportional to the radius of said light receiving portion or the radius of the circle or arc described by said incident beam, and thereafter adds to execute correction of a rotation angle detection position for the beam on the basis of an eccentricity between rotation centers of the two beams and centers of said at least two circular ring-shaped portions of said light receiving portion and outputs angle information corresponding to two or more incidence positions selected from the divided result.

67. (New) The apparatus of Claim 66, wherein at least one of the values proportional to the radius is normalized when calculated by said arithmetic system.

68. (New) The apparatus of Claim 65, wherein the angle information corresponding to the incidence positions is added, whereafter it is divided by the number of the added incident beams.

69. (New) The apparatus of Claim 66, wherein said light receiving portion has a number of light receiving elements proportional to the radius thereof.

70. (New) A beam rotation angle detecting apparatus comprising:

a light receiving portion having a ring-shaped portion, for detecting the incidence portions of at least two beam moving on concentric circles, forming a track as a circle or an arc, and for executing the detection; and

an arithmetic system,

wherein arithmetic system executes correction of a rotation angle detection position for the beam on the basis of an eccentricity between rotation centers of the two beams and a center of said ring-shaped portion of said light receiving portion, and said light receiving portion has a plurality of independent light receiving elements continuously constructed on the circumferences of the circles on which said beams move, and outputs of said plurality of light receiving elements are successively outputted in predetermined order at predetermined timing, and the outputs are detected to thereby find angle information corresponding to a plurality of beam incidence positions.

71. (New) A beam rotation angle detecting apparatus comprising:

a light receiving portion having a ring-shaped portion, for detecting the incidence positions of at least two beams moving on concentric circles, forming a track as a circle or an arc, and for executing the detection;

an arithmetic system

means for producing an address at predetermined timing, selecting at least one from the plurality of independent light receiving elements on the basis of the signal of the address and putting out an output of said light receiving element, and detecting the output to thereby obtain angle information corresponding to a plurality of beam incidence positions,

wherein said arithmetic system executes correction of a rotation angle detection position for the beam on the basis of an eccentricity between rotation centers of the two beams and a center of said ring-shaped portion of said light receiving portion, and said light receiving portion has a plurality of independent light receiving elements continuously constructed on the circumferences of the circles on which the beams move.

72. (New) The apparatus of Claim 71, further comprising address setting means for setting the value of the address so as to produce an address corresponding to the light receiving element from near the beam incidence position detected by said means for producing and detecting on the basis of angle information corresponding to said beam incidence position and a change therein.

73. (New) A rotation detecting apparatus comprising:

two members rotatable relative to each other, at least one of said two members having the function of forming on the other member at least two beams moving on concentric circles while forming a track as a circle or an arc in conformity with the relative rotation;

a light receiving portion provided on said other member, said light receiving portion detecting the incidence positions of said at least two beams; and

an arithmetic system for calculating angle information respectively corresponding to at least two incidence positions selected from among a plurality of light incidence positions detected by said light receiving portion, calculating corrected angle information in which a decentered amount of the beam is corrected by adding the calculated angle information, calculating and outputting the angle between a straight line linking together at least two incidence positions detected by said light receiving portion and a predetermined reference line on the basis of the calculation results, and detecting information concerning the relative rotation of said two members is detected on the basis of the output angle.

74. (New) The apparatus of Claim 73, wherein said one member has at least two light emitting portions for producing the beams moving along the circle or arc.

75. (New) The apparatus of Claim 74, wherein said at least two light emitting portions are disposed so that the centers of rotation of the beams moving along the circle or arc may coincide with the center of said light receiving portion.

76. (New) The apparatus of Claim 73, wherein said one member has at least two light transmitting windows for the incident light from the back side of said member to the said beams moving along the circle or arc.

77. (New) The apparatus of Claim 73, further comprising a condensing optical system or an orifice for making said at least two beams into light spots on said light receiving portion.

78. (New) The apparatus of Claim 73, wherein said one member has light deflecting means for changing the direction of incidence of the beams incident on said light receiving portion with the rotation of said one member.

79. (New) The apparatus of Claim 78, wherein said light deflecting means has at least two reflecting members.

80. (New) The apparatus of Claim 78, wherein said light deflecting means has at least two refracting members.

81. (New) The apparatus of Claim 78, wherein said light deflecting means has a diffraction grating.

82. (New) The apparatus of Claim 78, wherein said light deflecting means is formed with a plurality of patterns of a predetermined cross-sectional phase forming a

reflecting surface forming a predetermined angle with respect to the relative rotation plane of said one member, said patterns being continuously formed in parallel with the rotation plane.

83. (New) The apparatus of Claim 82, wherein said patterns of the predetermined cross-sectional shape are linear grooves or projections, or at least triangular polygonal pyramidal recesses.

84. (New) The apparatus of Claim 78, wherein said light deflecting means is formed with a plurality of patterns of a predetermined cross-sectional shape forming a refracting surface forming a predetermined angle with respect to the relative rotation plane of said one member, said patterns being continuously formed in parallel with the rotation plane.

85. (New) The apparatus of Claim 84, wherein said patterns of the predetermined cross-sectional shape are linear grooves or projections, or at least triangular polygonal pyramidal recesses.

86. (New) A beam rotation angle detecting method comprising:

the detection of the incidence positions of at least two beams moving on concentric circles while describing a circle or an arc; and

the calculation of the angle, which is obtained by correcting an eccentricity between rotation centers of the two beams, between a straight line linking together the detected at least two incidence positions and a predetermined reference line.

87. (New) The method of Claim 86, wherein said detection uses a circular ring-shaped light receiving portion disposed substantially concentrically with the circle on which said beams move.

88. (New) The method of Claim 87, wherein said detection comprises the step of expecting an output from the light receiving portion provided in the circular ring shape, and taking in the output of said light receiving portion from the vicinity of a light receiving position expected from the output.

89. (New) A rotation detection method comprising:

the formation of at least two beams moving on concentric circles while forming a track as a circle or an arc by at least one of two members, rotatable relative to each other, onto the other member in conformity with the relative rotation;

the detection of characteristics of the at least two beams incident onto said other member;

the detection of the incidence positions of the beams independently with respect to each beam having a predetermined characteristic; and

the calculation of the angle, which is obtained by correcting an eccentricity between rotation center of the two beams, between a straight line linking at least two

incidence positions together and a predetermined reference line, the information of the relative rotation being detected by the angle calculation.